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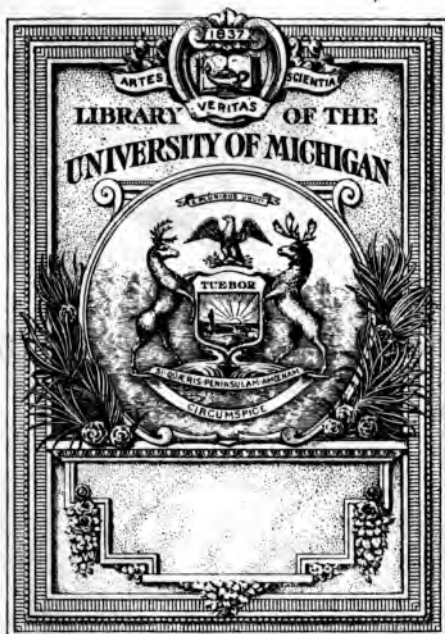
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# THE GYROSCOPE

REFERENCES TO BOOKS AND MAGAZINE ARTICLES

*Reprinted from the Monthly Bulletin, May 1917*



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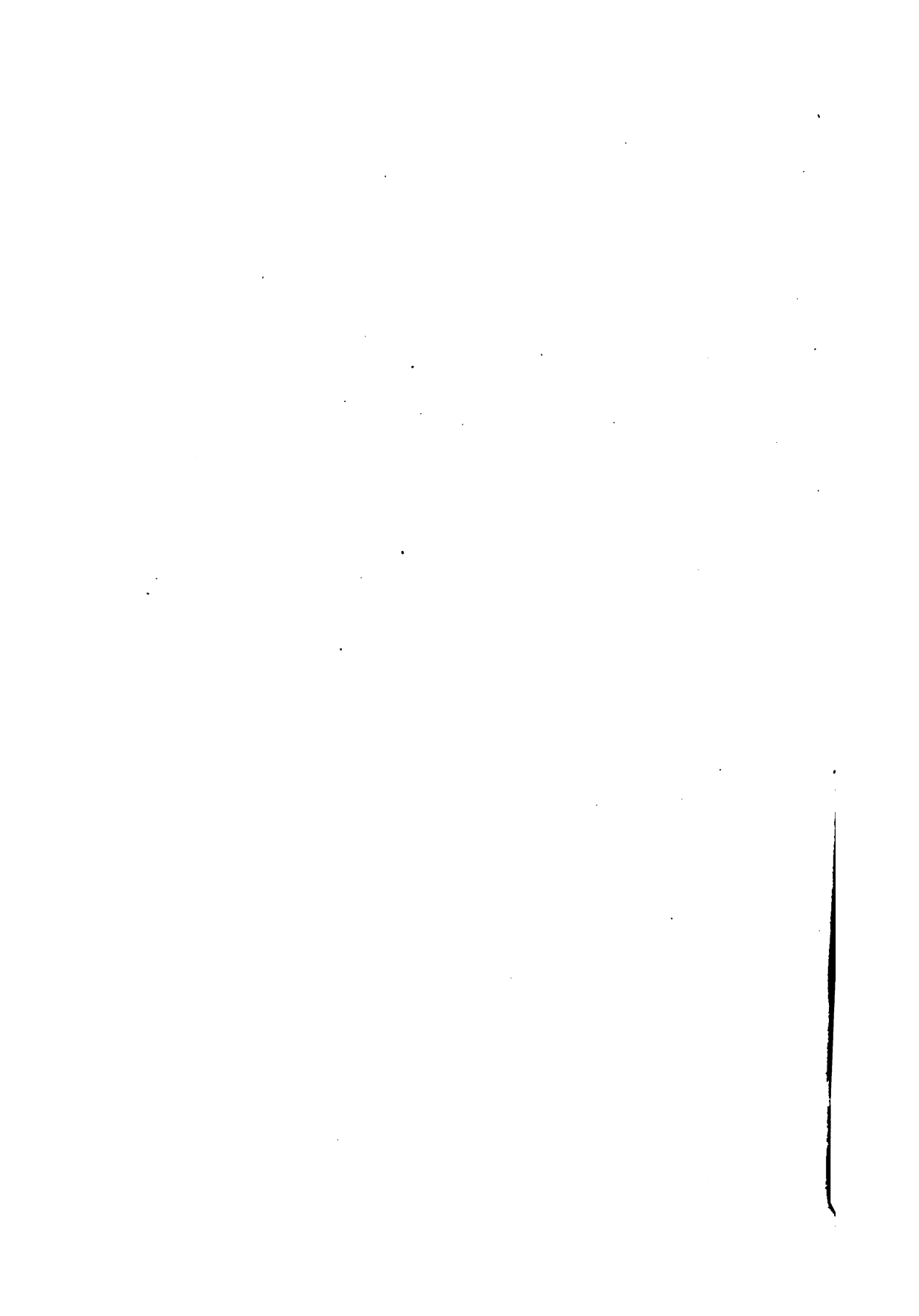
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## Synopsis

	Page
Bibliography - - - - -	5
Pure Theory of Gyroscopic and of Gyrostatic Action - - -	5
a. Popular - - - - -	5
b. Technical - - - - -	8
Practical Applications, with or without Theory - - - - -	13
a. General and Miscellaneous - - - - -	13
b. Monorail Cars and Similar Devices - - - - -	15
c. Aëroplane Stabilization - - - - -	17
d. Marine Navigation - - - - -	18
1. General and Miscellaneous - - - - -	18
2. Ship Stabilization - - - - -	19
3. Marine Compass - - - - -	21

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## The Gyroscope

Patrons of the Technology Department have shown considerable interest in the gyroscope and in some of its applications, particularly the monorailway.

The list of references here printed does not include everything available on the subject in this Library, but is mainly the result of several searches made in response to requests from our readers.

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### Pure Theory of Gyroscopic and of Gyrostatic Action

#### Popular

#### Barton, E. H.

Elementary theory of the gyroscope. 1910. (In Engineering, v.89, p.797.)

See also Longland, Walter.

Pearsall, R. H.

Wolff, C. E.

Treats a simple fundamental case of gyroscopic motion, employing only the elementary conceptions of mechanics and calculus.

#### Broomall, C. M.

The gyroscope. 1907. (In Scientific American supplement, v.64, p.82-83.)

Non-mathematical explanation of the action of the gyroscope.

#### Cordeiro, F. J. B.

The gyroscope. 1907. (In Popular astronomy, v.15, p.81-95, 146-165.)

Good outline of the principles of the gyroscope, together with the theory involved, and the analogy between gyroscopic action and terrestrial and astronomical phenomena.

#### Durant, Edward.

Electrically operated gyroscope. 1905. (In Scientific American, v.107, n. s. v.93, p.50.)

Describes the construction of a small, experimental, electrically driven gyroscope.



**Foord, C. W. H.**

A home-made gyroscope. 1909. (In Model engineer and electrician, v.21, p.97.)

Short description of method of making a small experimental gyroscope.

**Gray, Andrew.**

Gyrostats and gyrostatic action. 1914. (In Annual report of the Smithsonian Institution, v.69, pt.1, p.193-208.)

*The same.* 1913. (In Nature, v.91, p.148-153, 175-179.)

Reprinted from pamphlet published by the Royal Institution of Great Britain. Gives non-mathematical explanation of the gyroscope, with examples of its practical use. Author has also written a more technical article with the same title.

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Properties and methods of operation of gyroscopes. 1914. (In Transactions of the Institution of Engineers and Shipbuilders in Scotland, v.57, p.121-146.)

Illustrated experimental study.

**Gyroscope.** 1915. (In New international encyclopædia, Ed.2, v.10, p.530-531.)

Non-mathematical discussion of principles of gyroscopic action, together with references to various practical applications of the gyroscope.

**Gyrostats and their lessons.** 1915. (In Engineering, v.99, p.207-208.)

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Review of a lecture by Andrew Gray, presenting a non-mathematical study of various forms of gyroscopic apparatus.

**Johnson, Valentine Edward.**

Gyroscopic stability. 1913. (In Model engineer and electrician, v.29, p.586-587.)

Simple explanation of conditions of and reasons for gyrostatic stability.

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Illustrated description and details of small electrically driven experimental gyroscope.

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Letter to editor in criticism of paper by E. H. Barton.

**McCabe, Horace B.**

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*The same.* 1909. (In Scientific American supplement, v.68, p.413-414.)

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**Newkirk, Bert L.**

Gyroscopic phenomena. 1915. (In Scientific American supplement, v.79, p.380-381.)

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A little known property of the gyroscope. 1905. (In Nature, v.71, p.608-609.)

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Gyroscope in China. 1914. (In Scientific American, v.124, n.s. v.110, p.84-85, 90-91.)

Popular lecture on the gyroscope and its applications, as given in Y. M. C. A. lecture courses in China.

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The gyroscope, with explanations and experiments. 1856. (In American journal of education, v.2, p.701-707.)

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Étude sur le phénomène gyroscopique. 1909. (In *Revue de mécanique*, v.25, p.142-152.)

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**Bridge, John.**

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**Cayley, A.**

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**Clauzel, G.**

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Mechanics of the gyroscope. 1904. (In Technics, v.2, p.225-227.)

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**Gray, Andrew.**

Gyrostats and gyrostatic action. 1905. (In Transactions of the Institution of Engineers and Shipbuilders in Scotland, v.48, p.270-312.)

Discussion, p.313-329.

Includes description of experiments that may be performed to demonstrate gyroscopic action, and applications of the gyroscope to marine vessels. Considerable mathematics. Author has also written a popular article with same title.

**Gruey.**

Sur un nouveau pendule gyroscopique. 1878. (In Comptes rendus hebdomadaires des séances de l'Académie des Sciences, v.87, p.526-529.)

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Les pôles du gyroscope et des solides de révolution. 1885. (In *Comptes rendus hebdomadaires des séances de l'Académie des Sciences*, v.100, p.627-630.)

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Theoretical treatment.

**Newkirk, Burt L.**

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Theoretical treatment.

**Newton, H. A.**

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Mathematical treatment.

**Plücker.**

Ueber die Fessel'sche rotationsmaschine. 1853. (In *Annalen der physik und chemie*, v.178 [n. s.] v.90, p.174-177.)

Describes and explains theory of apparatus for demonstrating the properties of the gyroscope.

**Powell, Baden.**

Note on some experiments on rotatory motion. 1854. (In *London, Edinburgh, and Dublin philosophical magazine and journal of science*, ser.4, v.7, p.398-401.)

Author's observations and explanation of precessional movement.

**Resal, H.**

Sur la stabilité de l'équilibre de l'axe de la toupie gyroscopique. 1893. (In *Comptes rendus hebdomadaires des séances de l'Académie des Sciences*, v.117, p.499-502.)

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**Sire, G.**

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Mathematical discussion, with reference to theories of Euler, of Routh, and of Klein and Sommerfeld.

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On Fessel's gyroscope. 1854. (In *Proceedings of the Royal Society of London*, v.7, p.43-48.)

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Description of apparatus for demonstrating gyroscopic phenomena, together with explanation of those phenomena.

## Practical Applications

### General and Miscellaneous

**Cathcart, William L.**

Some notes on gyroscopic action. 1913. (In Journal of the American Society of Naval Engineers, v.25, p.597-612.)

Theoretical study of gyroscopic action, especially in regard to practical applications.

**Crabtree, Harold.**

Elementary treatment of the theory of spinning tops and gyroscopic motion. 1909. Longmans.

Many applications to practical uses.

**Franklin, W. S.**

Important practical problem in gyrostatic action. 1912. (In Physical review, v.34, p.48-52.)

Theoretical considerations of certain principles which apply when gyroscopes are put to practical use.

**Franklin, W. S.**

Some practical aspects of gyrostatic action. 1909. (In Popular science monthly, v.75, p.20-40.)

Treats, in popular style, of theory of the gyroscope and of its practical applications to monorail systems, marine vessels, aeroplanes, automobile fly-wheel action, boomerangs, etc.

**Gray, James G.**

On experiments leading up to new gyrostatic control for torpedoes, submarines, airships and aeroplanes. 1914. (In Transactions of the Institution of Engineers and Shipbuilders in Scotland, v.58, p.87-106.)

*The same.* 1915. (In Scientific American supplement, v.79, p.172-173, 188-189.)

Describes a number of gyrostatic devices for controlling moving bodies.

**Gray, James G.**

On gyrostatic devices for the control of moving bodies. 1914. (In Proceedings of the Physical Society of London, v.26, p.224-245.)

Abstract and discussion, p.246-247.

Describes a number of contrivances for stabilizing and forcibly maneuvering moving bodies, such as torpedoes and airships.

**Perry, J.**

Use of gyrostats. 1908. (In Nature, v.77, p.447-450.)

Discusses the various uses, together with some of the mathematical considerations involved.

**Recent** development in the design of gyroscopes. 1908. (In English mechanic and world of science, v.87, p.54-55.)

*The same.* 1908. (In Scientific American supplement, v.66, p.325-326.)

Describes the Ach type of gyroscope, together with its possible applications for engineering use.

**Some new gyrostats.** 1913. (In Model engineer and electrician, v.29, p.520-522.)

Illustrated popular description of newer applications of gyrostatic principles.



**Sperry, Elmer A.**

Electrically driven gyroscope and its uses. 1916. (In Proceedings of the Engineers' Club of Philadelphia, v.33, p.71-74.)

Applications to stabilization of ships and aeroplanes, and to the marine compass.

**Sperry, Elmer A.**

Engineering applications of the gyroscope. 1913. (In Journal of the Franklin Institute, v.175, p.447-482.)

*The same, abstract.* 1913. (In Engineering magazine, v.45, p.574-577.)

Considers its application to the stabilizing of ships, especially warships; its value in heavier-than-air machines; and various other engineering applications.

**Sperry, Elmer A.**

The gyroscope and its useful possibilities. 1910. (In Iron age, v.86, pt.2, p.1264-1268, 1322-1325, 1376-1379, 1432-1437.)

Excellent non-technical, illustrated explanation of the theory and applications of the gyroscope. Describes application to steering torpedoes, to stabilizing aeroplanes, automobiles and monorail cars, to steadying the roll of ships, to the gyroscopic compass, etc.

**Springer, J. F.**

The gyroscope. 1908. (In St. Nicholas, v.35, pt.1, p.419-422.)

Elementary discussion of the principles of the gyroscope, with brief references to some of its applications.

**Springer, J. F.**

Some applications of the gyroscope. 1908. (In American review of reviews, v.38, p.209-213.)

Popular treatment.

**Stone, J. Harris.**

Schilowsky gyroscope applied to ships and aeroplanes. 1914. (In Knowledge, v.37, n. s. v.11, p.209-210.)

*The same.* 1914. (In Scientific American supplement, v.78, p.28.)

Non-technical explanation of the adaptation of this gyroscope as a stabilizer.

**Stringham, Albert Warren.**

Transferring forces "around the corner." 106 p. 1916. [Sperry Gyroscope Co. Employees.]

*Contents:* Résumé.—Introduction.—Construction of the gyro demonstrator.—First commercial application of the gyroscope.—The compass without a needle.—Harnessing a gyro wheel.—The automatic pilot.—Aeroplane drift.—The pallograph.—The Sperry gyroscopic compass.—The Sperry searchlight.—Organization of the Sperry Gyroscope Company.—"Boxing the compass," by A. E. Gott.—"Jerry wiring," by A. E. Gott.—Biography: Elmer Ambrose Sperry.

Includes advertising matter.

**Thomas, Thomas R.**

Gyroscope and gyroscopic action in engineering practice. 1914. (In Journal of the American Society of Naval Engineers, v.26, p.306-307.)

Abstract of paper before the Institute of Marine Engineers.

Pertains to applications of gyroscope.

**Watson, William W.**

Gyrostatic action; its effect on steering. 1908. (In Automobile, v.18, p.436.)

Effect of gyroscopic action of automobile wheels and of engine fly-wheel on the steering of automobiles.

**Webster, Arthur Gordon.**

The gyroscope and how we may make it useful. 1908. (In American review of reviews, v.38, p.205-209.)

Popular, illustrated explanation of the action of the gyroscope, together with references to its practical application.

**Whitman, Roger B.**

Gyroscopic action of a flywheel. 1908. (In Automobile, v.18, p.75-76.)

Popular explanation of the gyroscopic effect of the fly-wheel of an automobile engine, especially in relation to the tendency of the automobile to capsize on a turn.

### **Monorail Cars and Similar Devices**

**Bolstorff, H.**

Die wirkungsweise der kreisel im einschiienenwagen. 1910. (In Annalen für gewerbe und bauwesen, v.66, p.74-78.)

Discusses the theory of the application of the gyroscope to monorail systems.

**Brennan mono-railway.** 1907. (In Electrician, v.59, p.172-174.)

*The same.* 1907. (In Engineering magazine, v.33, p.638-640.)

Application of the principles of the gyroscope to transportation problems.

**Cousins, H.**

Stability of gyroscopic single-track vehicles. 1913. (In Engineering, v.96, p.678-681, 711-712, 781-784.)

Theoretical discussion.

**Dantin, Ch.**

Automotrices monorails à gyroscopes systèmes Brennan et Scherl. 1910. (In Le Génie civil, v.56, p.410-413.)

Brief theory of the gyroscope, with descriptions of two systems of application to monorail roads.

**Dantin, Ch.**

Chemins de fer monorails à gyroscopes stabilisateurs. 1910. (In Le Génie civil, v.57, p.306-308.)

Brief mathematical review of gyroscopic theories and of monorail systems.

**Dickinson, A. F.**

Brennan gyroscope. 1910. (In Cassier's magazine, v.37, p.314-319.)

Simple illustrated explanation.

**Eddy, Henry T.**

Mechanical principles of Brennan's mono-rail car. 1910. (In Journal of the Franklin Institute, v.169, p.467-485.)

*The same.* 1911. (In Scientific American supplement, v.72, p.334-336.)

Author endeavors "to develop by brief elementary methods the mathematics and physics of the gyroscope, and their application to Brennan's Mono-rail Car."

**Gyroscope mono-rail railway.** 1907. (In Engineering news, v.57, p.598-599.)

Description of model of a monorail system invented by Louis Brennan.

**Huntington, Edward V.**

Elementary theory of the gyroscope in the Brennan monorail car. 1910. (In Engineering news, v.64, p.68-70.)

Mathematical treatment of the principles of the gyroscope, and its application to the Brennan monorail car.

**Johnson, Valentine Edward.**

The gyroscope; an experimental study, from spinning-top to monorail. 1911. Spon.

*The same.* 1909. (In Model engineer and electrician, v.21, p.364-366, 395-397, 490-494, 543, 593-594, 617-618.)

Series of experiments illustrating principles of the gyroscope and application to the monorail car.

**Johnson, Valentine Edward.**

Small gyroscopic mono railways; how to construct and use them. 1913. (In Model engineer and electrician, v.29, p.273-279, 297-301.)

Illustrated, with details of construction.

**Kübler, Wilhelm.**

Scherl monorail-road of Germany. 1909. (In American machinist, v.32, pt.2, p.1135-1138.)

Illustrated description of successful experimental road using cars with two gyrostats.

**Moffett, Cleveland.**

Transportation and the gyroscope. 1907. (In McClure's magazine, v.30, p.163-174.)

Popular article on the use of the gyroscope for stabilizing the monorail car. Special reference to the Brennan system.

**New gyroscopic monorail car.** 1910. (In Engineering news, v.63, p.99.)

*See also* editorial, p.101.

Illustrated description of the Brennan and the Scherl monorail cars.

**New gyroscopic mono-rail invention.** 1910. (In Model engineer and electrician, v.22, p.563-565.)

Illustrates and describes a new application of the gyroscopic principle to the monorail car.

**Pétré, J.**

L'automobile gyroscopique Schilowsky. 1914. (In Le Génie civil, v.65, p.195-198.)

*The same, abstract translation.* 1914. (In Automobile, v.31, p.264-265.)

Details of construction of a two-wheeled automobile in which stability is secured by means of a gyroscope.

**Principle of the bicycle applied to the motor car.** 1914. (In Scientific American, v.124, n. s. v.110, p.442, 453-454.)

Schilowsky monorail automobile. A two-wheeled automobile stabilized by means of a gyroscope.

**Scherl gyroscopic monorail car.** 1910. (In Scientific American, v.116, n. s. v.102, p.84-85.)

*See also* editorial, p.82.

Illustrates and describes the principles of operation.

**Schilowsky gyroscopic monorail system.** 1914. (In Engineer, v.117, p.106-107.)

Sketches and description of mechanical details.

**Schilowsky low-speed gyroscope monorail.** 1911. (In Scientific American, v.118, n. s. v.104, p.94.)

Methods used in maintaining equilibrium.

**Stone, J. Harris.**

Schilowsky gyroscope mono-rail system. 1914. (In Knowledge, v.37, n. s. v.11, p.131-132.)

Popular discussion of applications of the gyroscope, with special reference to Schilowsky's monorail work.

**Theory of the gyroscope.** 1907. (In *Engineering*, v.83, p.749.)

Mathematical explanation of the theory, referring to its application to the Brennan monorail car.

### **Aëroplane Stabilization**

**Büergin, Emil.**

Popular explanation of the motives of the gyroscope and its application in aviation. 1911. (In *Aircraft*, v.2, p.303.)

**Clarke, T. W. K.**

Gyrostatic vibration with two bladed and four bladed propellers. 1912. (In *Aeronautics*, v.5, p.220.)

Mathematical discussion pertaining to aëroplane propellers.

**Deisch, Noel.**

Gyroscopic force in revolving-cylinder motors. 1914. (In *Scientific American supplement*, v.77, p.50-51.)

Suggestions relating to the improvement of aëroplane stability.

**Fournier, Lucien.**

Gyroscopic balancing of aeroplanes. 1909. (In *Scientific American supplement*, v.67, p.309-310.)

Illustrated explanation of how the gyroscope may be used to maintain equilibrium in an aëroplane.

**Girardville, L.**

Sur la stabilisation des aéroplanes au moyen de gyroscopes. 1911. (In *Comptes rendus hebdomadaires des séances de l'Académie des Sciences*, v.152, p.127-129.)

*The same, translation.* 1911. (In *Aeronautics*, v.4, p.51-52.)

Gives results of experiments in stabilizing aéroplanes by the use of gyroscopes.

**Goddard, Robert H.**

Use of the gyroscope in the balancing and steering of aeroplanes. 1907. (In *Scientific American supplement*, v.63, p.26330.)

Explains action of gyroscopic stabilizers for aéroplanes, by using the analogy of a bird in flight.

**Gyroscope** rudders for steadying aeroplane flight. 1911. (In *Scientific American supplement*, v.71, p.136.)

Brief account of experiments by Girardville, in France, on the application of the gyroscope as an aëroplane stabilizer.

**Huntington, Edward V.**

Simple formula for computing gyroscopic forces in an aeroplane. 1913. (In *Science*, v.60, n. s. v.37, p.484-485.)

Treats of the magnitude of gyroscopic action of the revolving motor in an aëroplane.

**Huntington, Edward V.**

Simple rule for determining the direction of gyroscopic forces. 1912. (In *Scientific American*, v.121, n. s. v.107, p.439.)

Letter to editor, calling attention to error in contribution by Ralph M. Pearson.

**Ide, John Jay.**

Sperry gyroscopic stabilizer. 1914. (In *Scientific American*, v.125, n. s. v.111, p.96.)

Construction, operation and capabilities. Also outlines results of an interesting test in France, demonstrating use as aëroplane stabilizer.

**Lumet, G.**

Résultats et interprétation d'essais de moteurs d'aviation; conditions d'adaptation des moteurs sur les aéroplanes. 1912. (In *Mémoires et comptes rendu des travaux de la Société des Ingénieurs Civils de France*, 1912, pt.1, p.96-118.)

*The same, abstract translation.* 1912. (In *Aero*, v.4, p.262.)

Gyroscopic effect of aéroplane motors having rotating cylinders, p.114-118. Especially concerned with "Gnome" type of motor.

**Maintaining the stability of aeroplanes by means of gyroscopes.** 1911. (In *Scientific American*, v.119, n. s. v.105, p.82.)

Explanation of stabilizing influence of the gyroscope, and of its application in certain experiments on aéroplanes.

**Maxim, Hiram S.**

Wanted: research on gyroscopic action. 1912. (In *Scientific American*, v.121, n. s. v.107, p.347.)

Urges necessity of tests to determine the gyroscopic effect produced by the rotating engines of aéroplanes.

**Means, James.**

A possible cause of accidents to aviators. 1912. (In *Science*, v.59, n. s. v.36, p.825-826.)

Author proposes that qualified physicists should be encouraged to write answers to the question "Is it probable that the gyroscopic action of a revolving-cylinder engine produces dangerous stresses upon the framework of the flying-machine?"

**Pearson, Ralph M.**

The Quinby accident and gyroscopic force. 1912. (In *Scientific American*, v.121, n. s. v.107, p.347.)

*See also* Huntington, Edward V.

Author seeks to explain accident by attributing it to gyroscopic action in the "Gnome" motor used in the aéroplane.

**Skerrett, Robert G.**

Making the aeroplane safe by the gyroscopic stabilizer. 1913. (In *Scientific American*, v.122, n. s. v.108, p.511-512.)

Treats of Sperry's gyroscopic stabilizer for aéroplanes.

**Stabilisation des aéroplanes au moyen des gyroscopes.** 1911. (In *La Nature*, v.76, p.274-276.)

Discusses in popular style the principles of application of the gyroscope as a stabilizer for aéroplanes.

**Troller, A.**

Le gyroscope et l'aéroplane. 1911. (In *La Nature*, v.76, p.227-228.)

Concerned with the stabilizing effect of rotating motors on aéroplanes.

**Use of the gyroscope in connection with airships.** 1907. (In *Scientific American*, v.111, n. s. v.97, p.390.)

Use as a stabilizer.

## **Marine Navigation**

### **General and Miscellaneous**

**Föppel, A.**

Theory of Schlick's gyroscopic rolling brake. 1904. (In *Transactions of the Institution of Naval Architects*, v.46, p.128-134.)

Appendix to paper by Otto Schlick. Mathematical theory.

**Ford, H. C.**

Electrically driven gyroscope in marine work. 1914. (In Transactions of the American Institute of Electrical Engineers, v.33, pt.1, p.873-887.)

*The same.* 1914. (In Scientific American supplement, v.78, p.268-269, 284-285.)

*The same, abstract.* 1914. (In Engineering magazine, v.47, p.911-913.)

Principles and application in torpedo steering, compasses and stabilizers.

**Gardner's gyroscope.** 1914. (In Engineering, v.97, p.229.)

Deals particularly with torpedo gyroscopes, describing a new method of carrying the fly-wheel, as devised by John Gardner.

**Henderson, J. Blacklock.**

Some notes on the effects likely to be produced by the gyroscopic action of steam turbines on board vessels pitching in a sea. 1905. (In Transactions of the Institution of Engineers and Shipbuilders in Scotland, v.48, p.265-269.)

Discussion, p.313-329.

Mathematical discussion of stresses produced.

**Kelsey, W. R.**

Gyrostatic action and its bearing on certain points of engineering design. 1902. (In Electrical engineer, London, v.36, n. s. v.30, p.86-87.)

Mathematical discussion of stresses brought about by the gyroscopic action of rotating parts of machines, especially as applied to machinery on board ships.

**Steering gears.** 1915. (In Model engineer and electrician, v.33, p.316-317.)

Mentions use of gyroscope as an aid to the accurate steering of motor-boats.

**Williamson, W. P.**

Some notes on torpedo gyroscopes and their adjustment in service. 1916. (In Proceedings of the United States Naval Institute, v.42, p.157-170.)

#### Ship Stabilization

**Bucking the ice of the Great lakes with a gyro.** 1914. (In Scientific American, v.124, n. s. v.110, p.228.)

Equipment to make the car-ferry Ashtabula roll, and thus enable her to work her way through ice.

**Ransome, George S.**

Smashing a path through the lakes. 1914. (In Technical world magazine, v.20, p.908-910.)

Use of the gyroscope to rock vessels, so they can work their way through ice.

**Schlick, Otto.**

Gyroscopic effect of fly-wheels on board ship. 1904. (In Transactions of the Institution of Naval Architects, v.46, p.117-134.)

Discussion, p.134-144.

Appendix on theory of Schlick's gyroscopic rolling brake, by A. Föppel.

Author proposes that use be made of the gyroscopic action of a rotating fly-wheel in steadying the roll of ships.

Föppel's contribution is highly mathematical.

**Schlick, Otto.**

Gyroscopischen einfluss rotierender schwungräder an bord von schiffen. 1906. (In Zeitschrift des Vereines Deutscher Ingenieure, v.50, pt.2, p.1466-1468.)

Discusses the practicability of reducing the rolling of vessels by means of gyroscopes.

**Schlick, Otto.**

Versuche mit dem schiffskreisel. 1906. (In Zeitschrift des Vereines Deutscher Ingenieure, v.50, pt.2, p.1929-1934.)

*The same, translation.* 1907. (In Scientific American supplement, v.63, p.25968-25969.)

*The same, abstract translation.* 1907. (In Scientific American, v.110, n. s. v.96, p.494.)

Results of experiments made with a large gyroscope for diminishing the rolling of ships. Tests made on former German torpedo-boat Seebär.

**Schlick gyroscope on the "Lochiel."** 1909. (In Model engineer and electrician, v.20, p.187.)

Brief notice of experiments on the stabilizing action of the gyroscope on marine vessels.

**Schlick's marine gyroscope in use.** 1906. (In Scientific American, v.108, n. s. v.94, p.90.)

Explanation of its operation as a stabilizer.

**Skerrett, Robert G.**

Active gyroscope as a ship stabilizer. 1915. (In Scientific American, v.127, n. s. v.113, p.533, 547.)

Gives information as to the actual results that can be obtained by the use of the gyroscopic ship stabilizer, as shown by experiments.

**Skerrett, Robert G.**

Defying the ocean's billow. 1916. (In Illustrated world, v.25, p.93-96.)

Popular paper on the use of the gyroscope for stabilizing ships.

**Sperry, Elmer A.**

Active type of stabilizing gyro. 1912. (In Transactions of the Society of Naval Architects and Marine Engineers, v.20, p.201-215.)

Discussion, p.217-227.

*The same, slightly condensed.* 1913. (In Scientific American supplement, v.75, p.203-205.)

*The same, abstract.* 1913. (In Scientific American, v.123, n. s. v.109, p.149, 153.)

Illustrated, non-mathematical discussion of the application of the gyroscope stabilizer to ships.

**Sperry, Elmer A.**

Recent progress with the active type of gyro-stabilizer for ships. 1915. (In Transactions of the Society of Naval Architects and Marine Engineers, v.23, p.43-48.)

Discussion, p.48-50.

Outline of test results obtained with equipment on a yacht on the Great lakes.

**Sperry, Elmer A.**

Some graphic studies of the active gyro stabilizer. 1913. (In Transactions of the Society of Naval Architects and Marine Engineers, v.21, p.181-187.)

**Sperry, Elmer A.**—*continued.*

Discussion, p.187-189.

Outlines tests, and shows results obtained with an experimental gyro stabilizer. Considerable mathematics used. Results presented graphically.

**Sperry "active" gyroscope for stabilizing ships.** 1916. (In *Engineer*, v.122, p.172-173.)

Gyroscopic equipment for ships of the United States navy.

**White, William H.**

Experiments with Dr Schlick's gyroscopic apparatus for steadying ships. 1907. (In *Transactions of the Institution of Naval Architects*, v.49, p.157-166.)

Discussion, p.167-180.

*The same.* 1907. (In *Engineering*, v.83, p.448-451.)

Discussion, p.442-443.

*The same, abstract.* 1907. (In *Nature*, v.75, p.561-562.)

**Williams, Henry Smith.**

The gyroscope and ocean travel. 1907. (In *McClure's magazine*, v.30, p.174-176.)

Popular article on the use of the gyroscope for stabilizing ships.

**Wurl, M.**

Dr Schlick's gyroscopic apparatus for preventing ships from rolling. 1908. (In *Journal of the Royal Society of Arts*, v.56, p.546-552.)

Discussion, p.552-554.

*The same.* 1908. (In *Scientific American supplement*, v.65, p.396-398.)

Explains principles underlying the rolling of ships, and shows how this rolling may be remedied by the use of the gyroscope.

#### Marine Compass

**Admiral Fleuriats's gyroscopic horizon.** 1905. (In *Engineering*, v.79, p.361-362.)

An instrument for aiding in determining a ship's bearing when the natural horizon is not visible.

**Anschütz & Co. Kiel, Germany.**

Anschütz gyro compass; history, description, theory, practical use [tr. by G. K. B. Elphinstone]. 109 p. 1910. Elliot.

Confined to theory and practical use of gyrostatic principles as applied to the Anschütz gyro compass.

**Bache, René.**

To cast aside the magnetic compass. 1913. (In *Technical world magazine*, v.19, p.387-389.)

Popular description of the gyro-compass and of the principles involved in its use.

**Byrd, R. E. & Saunders, H. E.**

Advantages of the gyro compass. 1914. (In *Proceedings of the United States Naval Institute*, v.40, p.141-144.)

Summary of advantages, as shown by actual test.

**Collins, A. Frederick.**

Gyroscope as a compass. 1907. (In *Scientific American*, v.110, n. s. v.96, p.294-295.)

Illustrates and describes the Anschütz gyroscope, designed for the purpose of supplementing the ship's compass.



**Dinger, H. C.**

Sperry gyroscopic compass for naval vessels. 1911. (In Proceedings of the United States Naval Institute, v.37, pt.2, p.845-851.)

Illustrated description of this compass and its merits.

**Dubois, Edm.**

Réponse aux objections faites par M. Ledieu à l'emploi du gyroscope marin. 1872. (In Comptes rendus hebdomadaires des séances de l'Académie des Sciences, v.74, p.471.)

**Dubois, Edm.**

Sur le gyroscope marin. 1872. (In Comptes rendus hebdomadaires des séances de l'Académie des Sciences, v.74, p.232-235.)

*See also* Ledieu, A.

Mathematical treatment, relating to the gyro-compass.

**Dubois, Edm.**

Sur le gyroscope marin. 1884. (In Comptes rendus hebdomadaires des séances de l'Académie des Sciences, v.98, p.227-229.)

Results of application of the gyroscope to the marine compass.

**Elphinstone, G. K. B.**

Demonstration of the working of the Anschütz gyro-compass. 1911. (In Proceedings of the Physical Society of London, v.23, p.201-203.)

*The same, abstract.* 1911. (In Electrician, v.66, p.961-962.)

**Elphinstone, G. K. B.**

Gyrostatic compass and practical applications of gyrostats. 1912. (In Nature, v.89, p.74-75.)

*The same.* 1912. (In Engineer, v.113, p.235-236.)

Abstract of paper before the Royal Institution.

**Fredericks, A. C.**

The gyro-compass. 1911. (In Cassier's magazine, v.40, p.515-528.)

Illustrated discussion of the principles of the gyroscope and of the gyro-compass.

**Gillmor, R. E.**

Sperry gyro-compass in service. 1912. (In Transactions of the Society of Naval Architects and Marine Engineers, v.20, p.285-299.)

Discussion, p.299-300.

Explains the difficult problems that had to be solved in perfecting this instrument, giving an illustrated detailed description, and results of tests.

**Gillmor, R. E.**

Theory and operation of the gyroscope and the Sperry gyroscopic compass. 1912. (In Proceedings of the United States Naval Institute, v.38, pt.1, p.519-549.)

Explains principles of gyroscope, and gives theory of its use in connection with the marine compass. Non-mathematical.

**Gyro compass; its principle and construction.** 1911. (In Scientific American supplement, v.72, p.200-202.)

Illustrated non-mathematical explanation of the theory of the gyroscope, and of its practical applications.

**Ledieu, A.**

Objections au gyroscope marin proposé par M. E. Dubois dans la séance du 22 janvier. 1872. (In *Comptes rendus hebdomadaires des séances de l'Académie des Sciences*, v.74, p.313-314.)

*See also* response by Dubois, E.

**Marchand, H.**

Gyrostatic compass. 1911. (In *Annual report of the Smithsonian Institution*, v.66, pt.1, p.111-115.)

Translated from "Cosmos," Paris, 1911, p.181-184.

Non-mathematical discussion of the application of the gyroscope to the marine compass.

**New navy gyroscopic compass.** 1912. (In *Scientific American*, v.120, n. s. v.106, p.588-589.)

Illustrated description of the Sperry gyro-compass.

**Nulton, Louis M.**

Some notes on the principles of the gyroscopic compass, particularly the Sperry gyroscopic compass. 1915. (In *Proceedings of the United States Naval Institute*, v.41, p.1579-1621.)

Technical discussion of the application of the gyroscopic compass to navigation.

**Pineau, Maurice.**

Le compas gyroscopique de la marine allemande. 1912. (In *Revue générale des sciences pures et appliquées*, v.23, p.624-626.)

Description of the Anschütz compass and its advantages.

**Sperry gyro-compass.** 1912. (In *Engineering*, v.93, p.722.)

*The same.* 1912. (In *Engineering magazine*, v.43, p.754-757.)

Detailed description.

**Success of the marine gyroscope.** 1907. (In *Model engineer and electrician*, v.17, p.567.)

Brief comment on the success of Schlick's gyroscopic stabilizer for marine vessels.

**Trouvé, G.**

Gyroscopes électriques. 1890. (In *La Lumière électrique*, v.37, p.428-430.)

*The same.* 1890. (In *Le Génie civil*, v.17, p.350-351.)

*The same, abstract.* 1890. (In *Comptes rendus hebdomadaires des séances de l'Académie des Sciences*, v.111, p.357-361.)

Includes discussions of the application of the electric gyroscope to demonstrations of the earth's movement and to marine compass.



